TABLE 1.—*Solar radiation intensities during April, 1923.*

[Gram-calories per minute per square centimeter of normal surface.]

Washington, D. C.

Date.	Sun's zenith distance.										
	8 a.m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	Noon.
	75th mer. time.	Air mass.									Local mean solar time.
		A. M.					P. M.				
	e.	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Apr. 2	2.62	.....	0.71	0.83	1.05	1.38	1.11	.....	.....	.....	2.36
6	4.17	.....	0.65	0.83	1.03	1.41	1.03	0.79	0.64	.....	3.99
7	5.56	.....	0.66	0.91	.....	1.34	0.84	.....	.....	.....	4.37
9	2.49	0.73	0.85	1.00	1.22	.....	.....	.....	.....	.....	2.74
11	5.79	.....	0.57	0.75	0.96	.....	.....	.....	.....	.....	4.57
12	5.56	.....	.....	.....	0.89	1.09	.....	.....	.....	.....	5.79
18	3.00	.....	0.87	1.10	1.30	.....	.....	.....	.....	.....	2.87
19	3.30	0.71	0.82	0.94	1.08	1.41	1.02	0.84	0.70	0.59	3.63
20	7.57	.....	.....	.....	.....	1.35	0.98	0.81	0.72	0.60	4.37
21	7.04	.....	.....	.....	0.86	.....	.....	.....	.....	.....	7.57
23	6.50	.....	.....	0.80	.....	.....	.....	.....	.....	.....	7.57
24	3.45	0.85	0.94	1.06	1.25	1.39	1.07	0.89	0.74	0.59	3.15
25	4.57	.....	.....	0.98	1.18	1.41	1.05	0.83	0.71	0.59	4.17
26	3.81	.....	.....	.....	1.12	.....	.....	.....	.....	.....	3.30
Means	.....	0.76	0.76	0.92	1.09	1.35	1.01	0.83	0.70	0.59	.....
Departures	.....	+0.07	+0.01	+0.04	+0.02	−0.02	−0.06	−0.06	−0.03	+0.01	.....

Madison, Wis.

Apr. 5	3.00	.....	.....	.....	.....	1.44	1.25	1.09	.....	.....	3.30
12	3.30	.....	.....	.....	1.33	1.52	1.10	.....	.....	.....	4.37
14	4.37	.....	.....	.....	1.24	.....	.....	.....	.....	.....	3.81
17	3.99	.....	.....	.....	1.29	1.50	.....	.....	.....	.....	3.30
18	4.57	.....	.....	1.04	1.23	1.47	1.07	.....	.....	.....	5.36
19	5.36	.....	.....	.....	.....	1.36	.....	.....	.....	.....	8.18
20	7.29	.....	.....	.....	0.97	.....	.....	.....	.....	.....	8.81
25	4.17	.....	.....	.....	1.16	.....	.....	.....	.....	.....	5.16
28	4.95	.....	.....	.....	1.20	1.41	.....	.....	.....	.....	5.36
30	5.79	.....	.....	.....	1.00	.....	.....	.....	.....	.....	5.79
Means	.....	.....	.....	(1.04)	1.18	1.45	1.14	(1.09)	.....	.....	.....
Departures	.....	.....	.....	−0.05	−0.05	+0.03	−0.09	+0.01	.....	.....	.....

Lincoln, Nebr.

Date.	Sun's zenith distance.										
	8 a.m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	Noon.
	75th mer. time.	Air mass.									Local mean solar time.
		A. M.					P. M.				
	e.	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Apr. 5	4.17	.....	.....	0.67	1.04	.....	.....	.....	.....	.....	4.37
9	3.81	.....	.....	.....	1.31	.....	.....	.....	.....	.....	2.62
10	3.00	.....	0.80	0.93	1.19	.....	.....	.....	.....	.....	3.30
11	5.36	.....	.....	.....	.....	.....	.....	0.82	.....	.....	6.76
14	4.17	0.96	1.02	1.11	1.35	.....	.....	.....	.....	.....	3.45
17	3.63	.....	.....	.....	1.15	1.41	.....	.....	.....	.....	3.81
18	4.17	0.56	0.73	0.94	1.09	1.26	0.99	0.69	.....	.....	5.36
24	4.75	0.89	0.97	1.15	1.35	1.50	1.20	.....	.....	.....	6.50
30	7.29	.....	.....	.....	1.15	.....	.....	.....	.....	.....	7.57
Means	.....	0.80	0.88	0.96	1.20	1.39	(1.10)	(0.76)	.....	.....	.....
Departures	.....	+0.04	+0.03	−0.04	−0.02	−0.06	−0.07	−0.20	.....	.....	.....

*Extrapolated.

TABLE 2.—*Solar and sky radiation received on a horizontal surface.*

Week beginning.	Average daily radiation.			Average daily departure for the week.			Excess or deficiency since first of year.		
	Washington.	Madison.	Lincoln.	Washington.	Madison.	Lincoln.	Washington.	Madison.	Lincoln.
	cal.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*
Apr. 2	362	324	435	− 28	−57	+ 5	−2,836	−789	+ 479
9	306	445	497	−100	+49	+74	−3,534	−445	+1,000
16	508	443	429	+ 84	+28	+ 1	−2,948	−248	+1,007
23	430	457	425	− 16	+19	−23	−3,058	−117	+ 845

WEATHER OF NORTH AMERICA AND ADJACENT OCEANS.

NORTH ATLANTIC OCEAN.

By F. A. YOUNG.

The average pressure for the month was not far from the normal at land stations in Newfoundland and on the Atlantic coasts of Canada and the United States, as well as in the West Indies. It was somewhat above normal in the Azores and Bermudas, and also at Lerwick, Shetland Islands, while considerably below in England and Ireland, due to the period of low pressure in that locality that extended from the 6th to the 15th.

Fog was unusually prevalent over the Grand Banks, as it was reported on 17 days in the region between the 40th and 45th parallels and 45th and 55th meridians. The number of days in which it was observed was also considerably above the normal along the coast of the United States, north of Hatteras, and slightly above over the middle section of the steamer lanes, while fog was apparently rare in the vicinity of the European coast.

Considering the ocean as a whole, the stormy weather that had prevailed since August still continued, as the number of days on which winds of gale force were reported was considerably greater than usual, although unevenly distributed as to location. Gales were unusually numerous in the region between the 30th and 40th parallels and the 65th and 80th meridians, and also over the eastern section of the steamer lanes, while in mid-ocean the number of days on which they occurred did not differ materially from the normal as shown on the Pilot Chart.

On the 1st and 2d there was an area of unusually high pressure over the middle Atlantic States, while the atmospheric conditions in the West Indies were about normal. The steep gradient was responsible for stormy weather between the 70th meridian and the Georgia and Florida coasts, accompanied by comparatively high barometric readings. Storm log:

American S. S. *El Alba:*

April 1, 7 a. m. in latitude 31° 12′ N., longitude 79° 30′ W., barometer 30.39 inches, wind NE., 8, weather cloudy. 4 p. m. fresh NE. gale, high sea, overcast. 7 p. m. in latitude 33° N., longitude 77° 30′ W., barometer 30.62 inches, wind NE., 7, weather cloudy. Midnight, wind and seas moderating, overcast and squally.

American S. S. *Imlay:*

Gale began on the 1st, wind NE. Lowest barometer 30.07 inches at 7 p. m. on the 1st, wind NE., 8, in latitude 25° 30′ N., longitude 74° 15′ W. End on the 2d. Highest force of wind 9; shifts SE.–NE.–ENE.–SE.

On the 1st, St. Johns, Newfoundland, was near the center of an area of low pressure, and southwesterly gales prevailed in the southeasterly quadrants, as shown by following storm log:

U. S. Coast Guard cutter *Tampa:*

Gale began on the 1st, wind WSW. Lowest barometer 29.83 inches at 6 a. m. on the 1st, wind SW., in latitude 44° 05′ N., longitude 47° 07′ W. End at 3 p. m. on the 1st, wind NW. Highest force of wind 9; shifts WSW.–SW.–W.–NW.

From the 3d until the 5th there was no unusual weather, taking the ocean as a whole, although a few reports of moderate gales were received from vessels in the middle and eastern sections of the steamer lanes.

On the 6th there was a disturbance central near latitude 55° N., longitude 20° W., and gales were also reported from a limited area between the Bermudas and the 40th parallel. Storm logs:

British S. S. *Homeric:*

Gale began on the 6th, wind SW. Lowest barometer 29.34 inches at 3 a. m. on the 6th, wind SW. 4, in latitude 49° 07′ N., longitude 17° 04′ W. End on the 6th, wind NW. Highest force of wind 8; shifts SW.–NW.

British S. S. *Lingfield:*

Gale began on the 6th, wind SSW. Lowest barometer 29.82 inches at midnight on the 6th, wind SSW. 8, in latitude 36° 17′ N, longitude 67° 24′ W. End on the 7th, wind NNE. Highest force of wind 8; shifts 16 points.

Between the 7th and 10th heavy weather prevailed over the eastern section of the steamer lanes, with unusually low pressure along the British coast; the storm area varied considerably from day to day, both in extent and intensity, reaching its maximum on the 9th. Charts VIII and IX show the conditions on the 9th and 10th, respectively.

British S. S. *Cadillac:*

Gale began on the 7th, wind W.. Lowest barometer 29.57 inches at 4 p. m. on the 9th, wind NW., in latitude 46° 26′ N., longitude 28° 42′ W. End on the 11th, wind N. Highest force of wind 10, NW.; shifts WNW.–NW.

American S. S. *Glen Ridge:*

Gale began on the 8th, wind NW. Lowest barometer 29.31 inches at 4 p. m. on the 8th, wind NW., in latitude 47° 37′ N., longitude 27° 45′ W. End on the 9th, wind NNE. Highest force of wind 12; shifts N.–NNW.

American S. S. *St. Anthony:*

Gale began on the 9th, wind NW. Lowest barometer 29.42 inches at 6.30 a. m. on the 9th, wind NW.. 9, in latitude 44° 36′ N., longitude 24° W. End on the 9th, wind NW. Highest force of wind 10, NW.; shifts not given.

On the 11th and 12th comparatively moderate weather prevailed over this region, but by the 13th the area of low pressure in the vicinity of Great Britain became intensified, with the lowest barometric readings slightly over 29 inches and westerly gales in the southerly quadrants.

On the 14th the barometer began to rise slowly off the European coast, although there was little change in the storm area since the previous day.

On the 14th and 15th gales were encountered in the region between the Bermudas and Nantucket, and also by a few vessels in widely scattered positions, interspersed with reports indicating moderate conditions. Storm logs:

Norwegian M. S. *George Washington:*

Gale began on the 12th, wind NW. Lowest barometer 29.68 inches at 8 a. m. on the 13th, wind NW.. 9, in latitude 48° 40′ N., longitude 23° 55′ W. End on the 14th. Highest force of wind 9, WNW.; shifts not given.

British S. S. *Hydraspes:*

Gale began on the 13th, wind NE. Lowest barometer 29.74 inches at 10 p. m. on the 13th, wind ENE., 8, in latitude 37° 31′ N.. longitude 68° 18′ W. End on the 14th, wind E. Highest force of wind 8, ENE.; steady ENE.

On the 15th and 16th conditions were similar to those on the 14th, and on the 17th moderate winds were the rule over the entire ocean with the exception of a limited area off the coast of Ireland, as shown by the following storm log:

American S. S. *Saguache:*

Gale began on the 15th. Lowest barometer 29.56 inches at 3 p. m. on the 16th, wind S., 8, in latitude 49° 17′ N., longitude 17° 09′ W. End on the 17th. Highest force of wind 9; steady S.

On the 17th an area of low pressure central near St. Johns, Newfoundland, was apparently surrounded by moderate winds, although few reports were received from the northern quadrants. This LOW moved rapidly eastward, increasing in intensity, and on the 18th the center was near latitude 47° N., longitude 30° W. It continued its easterly movement, although with reduced speed, and on the 18th the center was not far from the coast of southern Europe, the storm area extending as far south as the 30th parallel. Storm logs:

British S. S. *Ventura de Larrinaga:*

Gale began on the 18th, wind WSW., 7. Lowest barometer 29.57 inches at 4 a. m. on the 18th, wind NNW., 9, in latitude 43° 30′ N., longitude 29° W. End on the 19th, wind WNW. Highest force of wind 9, NW.; shifts WSW.–W.–NNW.

American S. S. *President Polk:*

Gale began on the 18th, wind NE., 7. Lowest barometer 29.06 inches at 6 p. m. on the 18th, wind NE., 7, in latitude 48° 45′ N.. longitude 24° 35′ W. End on the 20th, wind NE. Highest force of wind 9; shifts WSW.–NE.–NNE.

Dutch S. S. *Salawati:*

Gale began on the 18th, wind WSW. Lowest barometer 29.84 inches at 8 a. m. on the 19th, wind WNW., 8, in latitude 37° 10′ N.. longitude 18° 30′ W. End on the 20th, wind NW. Highest force of wind 10, WNW.; shifts WSW.–WNW.

British S. S. *Ribera:*

Gale began on the 19th, wind WSW. Lowest barometer 29.46 inches at 10 a. m. on the 21st, wind W., 8, in latuitde 34° 24′ N., longitude 10° 07′ W. End on the 23d, wind SW. Highest force of wind 8, NW.; shifts NW.—W. by N.

On the 19th St. Johns, Newfoundland, was again near the center of a LOW that was responsible for gales over the region between the 30th and 45th parallels and the 50th and 60th meridians. Storm logs:

Dutch S. S. *Nieu Amsterdam:*

Gale began on the 19th, wind SSE. Lowest barometer 29.26 inches on the 19th, wind NW., 4, in latitude 40° 37′ N., longitude 56° 11′ W. End on the 19th, wind S. Highest force of wind 9; shifts SW.–NW.

American S. S. *Wildwood:*

Gale began on the 19th, wind S. Lowest barometer 29.76 inches at 7 p. m. on the 19th, wind WSW., 8, in latitude 31° 50′ N., longitude 58° 12′ W. End on the 20th, wind WNW. Highest force of wind 8; shifts S.–WNW.

On the 18th and 19th light to moderate winds were recorded at the land stations at Charleston, S. C., and Jacksonville, Fla., although on both dates a vessel only a short distance south of the former station encountered a strong northerly gale, as shown by following storm log:

Danish S. S. *Fredensbro:*

Gale began on the 18th, wind NNW. Lowest barometer 29.95 inches at 8 a. m. on the 18th, wind NNW., 9, in latitude 27° 32′ N., longitude 79° 35′ W. End on the 19th, wind NNE. Highest force of wind 10, N.; shifts NNW.–N.

The daily weather map for the 20th shows a trough of low pressure over the western part of the Gulf of Mexico, and southerly winds of gale force prevailed a short distance south of New Orleans. Storm log:

American S. S. *El Sud:*

Gale began on the 20th, wind S. Lowest barometer 29.92 inches at 1 a. m. on the 20th, wind S., 7, in latitude 28° 45′ N., longitude 91° 30′ W. End on the 20th, wind SSE. Highest force of wind 7, SSE.; shifts S.–SE.–SSE.

On the 21st and 22d there was one depression in the vicinity of Newfoundland and Nova Scotia and a second off the coast of southern Europe. Moderate conditions prevailed over the ocean as a whole, although a few

vessels in widely scattered positions encountered heavy weather. Storm log:

British S. S. *Araguaya:*

Gale began on the 22d, wind WSW., 7. Lowest barometer 29.76 inches at 7 a. m. on the 22d, wind WSW., 7, in latitude 37° 26′ N., longitude 69° 48′ W. End on the 23d, wind SW., 7. Highest force of wind 8, SW.; wind WSW. to SW. throughout.

The western disturbance remained nearly stationary until the 27th, when it began to move slowly eastward, and on the 28th the center was apparently a short distance east of St. Johns, Newfoundland; it was comparatively slight in intensity, and the only gales reported were on the 24th and 25th from a restricted area between the Bermudas and Nantucket, and on the 27th in the region between the 35th and 40th parallels and 45th and 50th meridians. Storm log:

American S. S. *Abron*:

Gale began on the 24th, wind NW. Lowest barometer 29.53 inches at 8 a. m. on the 25th, wind NW., 7, in latitude 38° N., longitude 67° W. End on the 26th, wind N. Highest force of wind 8, NW.; steady NW.

On the 25th and 26th a well-developed area of low pressure covered the greater part of the North Sea, and winds of gale force were recorded at the land stations at Lerwick, Shetland Islands, and also at Portland Bill on the south coast of England. Storm log:

British S. S. *Finchley:*

Gale began on the 24th, wind S. Lowest barometer 29.25 inches at 5 p. m. on the 25th, wind W., 8, in latitude 57° N., longitude 9° W. End on the 26th, wind NNE. Highest force of wind 8; shifts W.–NNE.

On the 29th there appeared a vigorous disturbance off the American coast, between New York and Charleston, that moved northeastward, and on the 30th was central between Portland and Eastport, Maine. The storm area was of limited extent, but vessels west of the 60th meridian experienced strong southerly to westerly gales. Storm log:

American S. S. *Chester Sun:*

Gale began on the 28th, wind S. Lowest barometer 29.42 inches at 9:35 p. m. on the 29th, wind SSW., in latitude 35° 48′ N., longitude 75° 19′ W. End on the 29th, wind NNW. Highest force of wind 11; shifts SSW.–NNW.

On the 29th and 30th moderate gales were also reported by a few vessels in the eastern section of the steamer lanes. Storm logs:

British S. S. *Norfolk Range:*

Gale began on the 29th, wind NE., 7. Lowest barometer 29.58 inches at 7 a. m. on the 29th, wind NE., 7, in latitude 54° 40′ N., longitude 26° 47′ W. End on the 30th wind NNE., 6. Highest force of wind 9; shifts NE.–NNE.

British S. S. *Comanchee:*

Gale began on the 29th, wind WSW. Lowest barometer 29.44 inches at 10 a. m. on the 30th, wind WSW., 7, in latitude 52° 46′ N., longitude 16° 52′ W. End on May 1, wind NW. Highest force of wind 8; shifts WSW.–N.–NW.

NORTH PACIFIC OCEAN.

By WILLIS E. HURD.

There was much fine weather over the North Pacific Ocean during April, although the fluctuating cyclonic activity over the northern area seemed to be much more pronounced and the conditions more unsettled than during March. Indeed, the wind on the 1st, 2d, and 12th attained a higher force, 11 to 12, than was reported for the preceding month. On the 1st and 2d, also, the lowest pressures of the two months occurred.

In the Hawaiian area the wind movement at Honolulu was somewhat higher than the average, being 10.7 miles per hour as compared with the 19-year average of 9.1 miles. The highest velocity was 30 miles from the east on the 29th, and the prevailing direction was east. For the greater part of April Honolulu lay on the southwestern slope of the North Pacific HIGH. On the 24th to 26th it lay within a depression which finally disappeared without having taken on apparent progressive movement. That the depression developed some slight intensity, however, is evidenced by an observation of the American S. S. *President Pierce*, in latitude 25° 10′ N., longitude 166° 30′ W., on the 25th, when a gale of force 8 from the north-northwest was observed, pressure 29.78 inches. The gale on the 29th at Honolulu was due to the rather steep gradient on the southern slope of the high-pressure area, which at this time had shifted to the north of Hawaii.

In the tropical storm regions no cyclonic activity of moment seems to have occurred, and only a few scattered gales disturbed the general serenity. On the 19th the northeast monsoon was reported of gale force, accompanied by rain and fog, near the lower entrance to the Formosa Channel; and on the same and other dates, at the opposite extreme of the ocean, the Gulf of Tehuantepec was swept by intermittent northerly to westerly gales.

Off the Mexican and Central American coasts light northwesterly winds were of frequent occurrence, but interspersed with variable breezes. In the main the weather experienced by the American S. S. *Venezuela* from the 12th to the 26th, while steaming up the coast from Panama toward San Pedro, is descriptive of the typical spring conditions in these waters. Captain W. J. Allen thus commented:

In April on the west coast of Central America it was observed the winds were very variable—no land nor sea breezes prevailing—light breezes from any quadrant and frequent calms. Clear and cloudy, frequently overcast and very hazy at night, with threatening rain, but no heavy showers.

Respecting the traveling storms of this month, several crossed Japan, coming from the Asiatic continent. Pressure was low over this area on the 4th and 5th, 7th to 12th, 18th and 19th, and 27th to 29th. Dangerous gales occurred over the Japan Sea on the 12th, particularly. The Canadian S. S. *Canadian Prospector* reported a "fierce storm," with violent squalls of hurricane force, overcast and misty, wind NW. to N., in latitude 37° 41′ N., longitude 134° 04′ E., lowest pressure 28.86 inches. Westerly gales of force 8 to 10 were reported by several vessels immediately to the eastward of Japan on this date.

Among the storms, or LOWS, that entered the American continent, nearly all were offshoots from the prevailing cyclonic areas to the westward, rather than eastward-moving storms in their entirety. These secondary developments entered the coast at some point between Oregon and Alaska on the 2d, 6th, 15th, 16th, 20th, 24th, and 30th.

The severe disturbance of the 1st to 2d of April, of which mention was made in the report on the weather of March, developed hurricane violence. It was central on the 1st in about 48° N., 177° E., and on the 2d in approximately 50° N., 166° W. On the 2d another violent cyclone was central near 48° N., 160° E., and on the 3d near 48° N., 170° E. Both storm centers filled up considerably on the 4th. The lowest pressure observed in connection with these disturbances was 28.20 inches, reported by the Japanese S. S. *Kaga Maru* as occurring early on the morning of the 2d, in latitude 50° N., longitude 176° 30′ E. The minimum reading on the 1st was 28.24 inches, as noted in the preceding report. The *Kaga Maru*, steaming toward Yokohama,